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The effects and differences of kidney transplantation and hemodialysis treatments on quality of life

Böbrek nakli ve hemodiyaliz hastalarında yaşam kalitesini etkileyen faktörler farklılık göstermektedir

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ABSTRACT

Aim: Renal replacement therapies (RRT), including dialysis modalities and renal transplantation (RT), affect patients' quality of life (QoL) differently. This study aimed to determine the factors affecting the QoL in hemodialysis (HD) and RT patients.

Material and Method: One hundred patients in each RT and HD group were included in the study. Socio-demographic data was determined with a questionnaire. Laboratory information and other medical information of the patients were obtained from the medical records. Short Form-36 (SF-36) and Nottingham Health Profile (NHP) scales were used to assess the QoL.

Results: The mean ages in HD and RT patients were 58.28±15.21 and 47.92±12.01 years. Most patients were male (53% HD, 68% RT). RT patients had a higher QoL than HD patients in all components. On the NHP scale, RT patients had higher QoL in all parts except social isolation and emotional reactions. Male gender, non-smoker status, high education level, being employed and living in the city, and some laboratory parameters (hemoglobin, ferritin, sodium, calcium, magnesium, and albumin) positively affected the QoL in the HD group; diabetes and CVD had a negative impact on the QoL. In the RT group, male gender, high education level, being employed; normal potassium, phosphorus, and parathormone levels affect QoL positively while hypertension and CVD negatively affect the QoL.

Conclusion: Factors affecting QoL in patients receiving RRT are different. Efforts to correct laboratory parameters may impact the quality of life in HD patients. Returning to working life could increase the QoL in RT patients.

Keywords: Hemodialysis, quality of life, renal transplantation

ÖZ

Amaç: Diyaliz modalitelerini ve böbrek naklini (BN) içeren renal replasman tedavileri (RRT), hastaların yaşam kalitesini (QoL) farklı şekilde etkiler. Bu çalışmada hemodiyaliz (HD) ve BN hastalarında yaşam kalitesini etkileyen faktörlerin belirlenmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışmaya RT ve HD gruplarının her birinde 100 hasta dahil edildi. Sosyo-demografik veriler anket yolu ile toplandı. Hastaların laboratuvar ve diğer tıbbi bilgileri tıbbi kayıtlarından elde edildi. Yaşam kalitesini değerlendirmek için Kısa Form-36 (SF-36) ve Nottingham Sağlık Profili (NHP) ölçekleri kullanıldı.

Bulgular: HD ve BN hastalarında ortalama yaşlar sırasıyla 58,28±15,21 ve 47,92±12,01 idi. Hastaların çoğu erkekti (%53 HD, %68 BN). Böbrek nakli hastaları, tüm bileşenlerde HD hastalarından daha yüksek bir yaşam kalitesine sahipti. NHP ölçeğinde, BN hastalarının sosyal izolasyon ve duygusal tepkiler dışında tüm alanlarda yaşam kalitesi daha yüksekti. HD grubunda erkek cinsiyet, sigara içmeme, yüksek eğitim düzeyi, çalışıyor ve şehirde yaşıyor olmak ile bazı laboratuvar parametreleri (hemoglobin, ferritin, sodyum, kalsiyum, magnezyum ve albümin düzeyleri) yaşam kalitesini olumlu yönde etkilerken; diyabet ve kardiyovasküler hastalık (KVH) yaşam kalitesi üzerinde olumsuz bir etkiye sahipti. BN grubunda erkek cinsiyet, yüksek eğitim düzeyi, çalışıyor olmak; normal potasyum, fosfor ve parathormon seviyeleri QoL'yi olumlu etkilerken, KVH ve hipertansiyon QoL'yi olumsuz etkilemekteydi.

Sonuç: Farklı RRT alan hastalarda yaşam kalitesini etkileyen faktörler farklıdır. HD hastalarında laboratuvar parametrelerini düzeltmek için çaba göstermek yaşam kalitesi üzerinde etkili olabilir. Çalışma hayatına dönüş, BN hastalarında yaşam kalitesini artırabilir.

Anahtar Kelimeler: Böbrek nakli, hemodiyaliz, yaşam kalitesi

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INTRODUCTION

Chronic kidney disease is a common public health problem (1). Renal replacement therapies (RRT) have prolonged the life expectancy in patients with end-stage renal disease and indirectly increased the number of patients. Increasing the survival of patients has brought with it efforts to improve the quality of life (QoL) in patients.

Improvement of QoL is as significant as survival in patients with end-stage renal disease. In addition to the presence of factors such as anemia and depression that affect the general population and affect the QoL in patients receiving RRT, there are various factors specific to these patients. RRT, including dialysis modalities and renal transplantation (RT), affect patients' QoL differently (2). Renal transplant patients offer better QoL compared to dialysis modalities. On the other hand, when all patient groups are evaluated separately, serious differences are observed in the quality of life of the patients. We have limited information about the factors affecting the QoL in patients treated with given treatments, apart from the RRT modality. This study aimed to determine the factors affecting the QoL in hemodialysis (HD) and RT patients.

MATERIAL AND METHOD

The study was initiated with the approval of the Ondokuz Mayıs University Clinical Researches Ethics Committee (Date: 26.06.2020, Decision No: 2020/417), and the study was conducted under the ethical standards specified in the Helsinki Declaration. One hundred RT and one hundred HD patients who were followed up at Ondokuz Mayıs University Medical Faculty Hospital between June 1, 2020, and June 30, 2021, met the study criteria. Patients aged 18 years and older who had been on hemodialysis treatment for at least one year and patients with RT followed for more than six months without any rejection were included in the study. HD patients younger than 18 years of age or with mental/psychological disease or under HD treatment for less than one year were not included in the study. Patients with transplantation duration of fewer than six months or RT patients with concomitant malignancy or active infection were excluded.

Socio-demographic data was determined with a questionnaire. Laboratory information and other medical information of the patients were obtained from the medical records. Short Form-36 (SF-36) and Nottingham Health Profile (NHP) scales were used to assess the QoL. SF-36 and NHP are reliable tests for measuring the QoL. Studies showed the validity and reliability of the Turkish versions (3,4).

The SF-36 scale consists of 36 questions under eight titles (Physical Function, Physical Role Restriction, Social Function, Mental Health, Emotional Role Restriction, Energy/Vitality, Pain, General Health Perception), and each title score is evaluated between 0-100. High scores are associated with a higher QoL.

NHP consists of two parts. The first part has 38 questions with 'yes' or 'no' answers. There are questions about pain (8 questions), emotional reactions (9 questions), sleep patterns (5 questions), physical activity (8 questions), social isolation, and energy (6 questions). In the second part, the effects of the participants' health status on their daily lives are questioned. The second part examines whether daily life routines such as work-life, social life, home life, sexual life, hobbies, and holidays are affected. A 'yes' answer on each item represents the most severe complaint and gets the highest score. When the score of all 'yes' responses to a topic is summed up, 100 points are reached. Thus, zero reflects the best health status, while a hundred points reflect the worst health.

We aimed to determine the factors affecting the QoL in HD and RT patients.

Statistical Analysis

In descriptive statistics, numbers and percentages are given for categorical variables. Kolmogorov-Smirnov and Shapiro-Wilk tests were used to determine the conformity of continuous variables to normal distribution. The mean and standard deviation for continuous variables fit the normal distribution; median and minimum-maximum values are given if they do not provide the normal distribution. Median and 25-75 percentile values were used for the SF-36 and NHP scales that did not offer the normal distribution. In analytical analyses, the relationship between categorical variables was evaluated with chi-square and, where appropriate, Fisher's exact chi-square test. In comparing the means, the Student-T test was used for groups with normal distribution, and the Mann-Whitney-U test was used for groups that did not. The statistical significance level was accepted as $p<0.05$. Data entry and statistical analysis were performed with IBM SPSS Statistics for Windows, version 26 (IBM Corp., Armonk, N.Y., USA).

RESULTS

In the patients included in the study, the mean ages were 58.28±15.21 and 47.92±12.01 years in HD and RT patients, respectively. Most patients were male (53% HD, 68% RT). **Table 1** shows the demographic and clinical characteristics of the patients.

When the two types of RRT were compared, there was no difference between the groups regarding gender, educational status, marital status, and survival. Age, smoking, employment status, residence, type of dialysis, and comorbidity differed between the groups (**Table 1**).

Table 1. Demographic and epidemiological characteristics of patients according to renal replacement therapy type

	HD (n=100)	RT (n=100)	p
Age (years)	58.28±15.21	47.92±12.01	<0.001
Gender (n)			0.108
Male	57	68	
Female	43	32	
Smoking			0.011
Non-smoker	52	54	
Smoker	18	5	
Ex-smoker	30	41	
Education status			0.120
Not graduated	6	7	
Primary school	71	60	
High school	18	21	
Associate degree	0	6	
License	5	6	
Marital status			0.432
Single	23	21	
Married	77	79	
Home situation			0.470
Single	3	5	
With family	97	95	
Employment status			0.001
Unemployed	91	73	
Employed	9	27	
Living place			<0.001
Village	13	30	
Town	23	38	
City center	64	32	
HD vascular access			<0.001
Catheter	18	9	
Fistula	82	63	
No (Pre-emptive)	0	28	
Hypertension (yes)	80	58	0.001
Diabetes mellitus (yes)	43	24	0.004
Cardiovascular disease (yes)	34	21	0.040
Co-morbid disease (n)	2 (0-3)	1 (0-3)	<0.001

HD: Hemodialysis, RT: Renal transplantation

When RT patients and HD patients were compared according to the SF-36 scale, RT patients had a higher QoL in all components. On the NHP scale, RT patients had higher QoL in all parts except social isolation and emotional reactions (**Table 2**).

When the effect of demographic characteristics on the QoL was examined (**Table 3**), the QoL was better in the male gender, and the difference in the QoL due to gender was more pronounced in RT patients. Active smoking affected the general health perception component of SF-36 in HD patients. There was no effect of active smoking on QoL in RT patients.

Table 2. Short Form-36 and Nottingham Health Profile scores by type of renal replacement therapy

	HD	RT	p
SF-36			
Physical function	62.50 (35-85)	90.00 (81.25-95)	<0.001
Physical role restriction	75 (25-100)	100 (75-100)	<0.001
Social function	87.50 (53,13-100)	100 (90.62-100)	<0.001
Mental health	68 (56-80)	76 (64-88)	0.004
Emotional role restriction	66.66 (33.33-100)	100 (66.66-100)	0.012
Energy/vitality	50 (30-70)	67.50 (55-85)	<0.001
Pain	67.50 (35-100)	90 (71.88-100)	<0.001
General health perception	45 (30-60)	70 (41.25-80)	<0.001
NHP			
NHP total score	122.78 (69.91-253.36)	50.58 (22.01-92.91)	<0.001
Pain NHP	20.33 (0-48.54)	0 (0-10.49)	<0.001
Emotional reactions	10.47 (0-35.30)	10.47 (0-23.71)	0.380
Sleep	28.67 (12.57-60.13)	12.57 (0-39.83)	<0.001
Social isolation	0 (0-22.53)	0 (0-21.54)	0.066
Physical activity	21.88 (0-52.67)	0 (0-0)	<0.001
Energy	24 (0-100)	0 (0-124)	<0.001

HD: Hemodialysis, RT: Renal transplantation, SF-36: Short Form-36, NHP: Nottingham Health Profile

Higher education was associated with better QoL. Educational status affected the physical function component of SF-36 in HD patients and the physical function and Energy/Vitality components of SF-36 in RT patients. Marital status was not effective on QoL in RT and HD patients. Home status didn't affect the patients' QoL (**Table 3**).

Employed was associated with a higher QoL. Employment status affected the physical function component in the SF-36 scale and the total score, emotional reaction, sleep, and energy components in the NHP scale of HD patients. Physical function, energy/vitality components on the SF-36 scale, and total score and parts in the NHP scale of RT patients were affected by working status. The most affected component was the physical function component of SF-36 in RT patients (p<0.001).

Vascular access (catheter or fistula) did not affect the QoL in HD patients and donor status (cadaver or living donor) in RT patients. Living in the city caused a significant difference in the emotional role restriction component of the SF-36 scale in HD patients. RT did not affect the QoL in patients. Hemoglobin, ferritin, sodium, calcium, magnesium, and albumin levels affected the QoL in HD patients. Potassium, phosphorus, and parathormone levels in the normal range in RT patients positively impact the QoL.

When all patients were evaluated together, comorbidity negatively affected the QoL. Physical function, physical role restriction, and energy components of the SF-36 scale were more affected. The presence of comorbidity decreased the HD group's QoL. The co-morbid condition that most affected the QoL was the presence of cardiovascular disease (CVD). In the SF-36 scale, comorbidity more significantly affected the results.

Table 3. Comparison of the effects of demographic characteristics on quality of life in hemodialysis and renal transplant patients

	Gender		Active smoker		Education		Marital status		Home situation		Employment		Vascular access/ Donor type		Living place	
	HD	RT	HD	RT	HD	RT	HD	RT	HD	RT	HD	RT	Fistula/ catheter	Living/ cadaveric	HD	RT
SF-36																
Physical function	✓	✓✓			✓	✓					✓	✓✓				
Physical role restriction		✓✓														
Social function																
Mental health																
Emotional role restriction		✓													✓	
Energy/Vitality						✓										
Pain		✓										✓				
General health perception		✓	✓													
NHP																
NHP total score	✓	✓									✓	✓				
Pain NHP		✓										✓				
Emotional reactions		✓									✓					
Sleep											✓✓					
Social isolation																
Physical activity	✓	✓✓														
Energy											✓					

✓ : p<0.05; ✓✓: p<0.001, HD: Hemodialysis, RT: Renal transplantation, SF-36: Short Form-36, NHP: Nottingham Health Profile

Table 4. Comparison of the effects of laboratory parameters on the quality of life in hemodialysis and kidney transplant patients

	Hb (11,9-14,6)		Ferritin (100-400)		Na (135-145)		K (3,5-5,5)		Ca (8,8-10,2)		P (2,3-4,7)		Mg (0,66-0,99)		PTH (150-650)		Albumin (3,5-5,5)	
	HD	RT	HD	RT	HD	RT	HD	RT	HD	RT	HD	RT	HD	RT	HD	RT	HD	RT
SF-36																		
Physical function			✓		✓				✓								✓	
Physical role restriction	✓											✓					✓	
Social function					✓				✓✓								✓	
Mental health	✓		✓						✓				✓					
Emotional role restriction			✓		✓			✓	✓								✓	
Energy/Vitality	✓		✓✓		✓											✓	✓	
Pain													✓					
General health perception			✓													✓	✓	
NHP																		
NHP total score			✓						✓								✓	
Pain NHP																		
Emotional reactions																	✓	
Sleep													✓				✓	
Social isolation																	✓	
Physical activity									✓			✓						
Energy			✓✓		✓				✓								✓	

Hb: Hemoglobin, Na: Sodium, K: Potassium, Ca: Calcium, P: Phosphorus, Mg: Magnesium, PTH: Parathormone, HD: Hemodialysis, RT: Renal transplantation, SF-36: Short Form-36, NHP: Nottingham Health Profile, ✓ : p<0.05 ✓✓: p<0.001. Note: Our central laboratory's normal serum level ranges are in parentheses. The comparison was made between patients with and without serum levels in the normal range.

Table 5. The effect of co-morbid diseases on SF-36 and NHP scores

	Hypertension			Diabetes mellitus			Cardiovascular disease		
	All patients	HD	RT	All patients	HD	RT	All patients	HD	RT
SF-36									
Physical function	✓✓			✓✓	✓		✓✓		✓✓
Physical role restriction	✓		✓				✓	✓	
Social function							✓		
Mental health							✓	✓	
Emotional role restriction							✓	✓	
Energy/Vitality	✓			✓	✓		✓✓	✓	
Pain	✓						✓	✓	
General health perception							✓✓	✓	
NHP									
NHP total score							✓	✓	
Pain NHP									
Emotional reactions							✓	✓✓	
Sleep							✓	✓	
Social isolation							✓		
Physical activity	✓			✓			✓		
Energy	✓			✓					

✓: p<0.05, ✓✓: p<0.001, HD: Hemodialysis, RT: Renal transplantation, SF-36: Short Form-36, NHP: Nottingham Health Profile

Male gender, non-smoker, high education level, being employed and living in the city, and some laboratory parameters (hemoglobin, ferritin, sodium, calcium, magnesium, and albumin levels) positively affected the QoL in the HD group; diabetes and CVD had a negative impact. In the RT group, male gender, high education level, being employed; normal potassium, phosphorus, and parathormone levels affect the QoL positively, while hypertension and CVD negatively affect the QoL (**Table 6**).

Table 6. Effects of demographic characteristics, laboratory values, and co-morbid diseases on quality of life in hemodialysis and renal transplantation patients

Factors	Hemodialysis		Renal transplantation	
	SF-36	NHP	SF-36	NSP
Genders	✓	✓	✓✓	✓✓
Active smoker	✓	-	-	-
Education	✓	-	✓	-
Marital status	-	-	-	-
Home situation	-	-	-	-
Employment	✓	✓✓	✓✓	✓
HD vascular access	-	-		
Donor type			-	-
Living place	✓	-	-	-
Hemoglobin	✓	-	-	-
Ferritin	✓✓	✓✓	-	-
Sodium	✓	✓	-	-
Potassium	-	-	✓	-
Calcium	✓	✓	-	-
Phosphorus	-	-	✓	✓
Magnesium	✓	✓	-	-
Parathormone	-	-	✓	✓
Albumin	✓	✓	-	-
Hypertension	-	-	✓	-
Diabetes Mellitus	✓	-	-	-
CVD	✓	✓	✓	-

✓: p<0.05, ✓✓: p<0.001, SF-36: Short Form-36, NHP: Nottingham Health Profile, HD: Hemodialysis, CVD: Cardiovascular disease

DISCUSSION

Many studies have evaluated the QoL of CKD patients receiving different RRT modalities. In these studies, RT was superior to HD in terms of QoL (4). Our study found that RT patients had a better QoL than HD patients. Biochemical parameters such as hemoglobin, ferritin, sodium, calcium, magnesium, and albumin affected the QoL more in the HD group, and social factors such as high education level and being an employee were more effective in the RT group, as well as the male gender.

Our study showed that the QoL in RT patients was better than in HD patients, in line with the literature. A large meta-analysis showed that RT patients had better QoL than HD patients (4). A study showed no difference between the groups regarding anxiety and depression in HD and RT patients and QoL was better in RT patients (5). In another study conducted with The Kidney Disease Quality of Life (KDQOL) and EuroQOL scales, the QoL of RT patients was better than HD patients on both scales (6).

Different parameters affect the results of the QoL differently. The first of these is gender. In a study investigating the effects of gender and race on the QoL in RT patients, the results were significantly lower in the female gender group on all scales (7). Similarly, in a study using the SF-36 scale, the scores were lower in females (8). In another study, patients with chronic kidney disease at different stages were compared using the KDQOL scale, and women had a lower QoL (9). In our study, we found that the female gender negatively affected the results in both HD and RT patients.

Employment status affects the QoL. The QoL of employed patients after transplantation is better in RT patients (10,11). In our study, the employed position positively impacted the results of both HD and RT patients. While this is easier to explain in renal transplant patients, it may be more difficult in HD patients. However, although it is speculative, the QoL of patients who have better physical performance and can work may be responsible for this result.

Our study found no statistically significant difference when marital status was compared to RRT and gender. There are inconsistent results in the literature (12-14). In a meta-analysis of 34 randomized controlled studies, marriage did not affect the QoL of patients receiving RRT (15). In this respect, our study is compatible with the meta-analysis results.

A study in our country showed that 98.7% of RT patients and 91.8% of HD patients live with their families. The same researchers stated that this situation did not affect the QoL (3). Our study found that marital and social status at home did not affect the test results in either HD or RT patients.

Many previous studies have shown a correlation between education level and QoL (16,17). In our study, we found that higher education level was associated with increased QoL, consistent with the literature. This result may be related to patients with higher education levels having better drug compliance and heightened awareness of possible complications.

Donor status affects the QoL in RT patients. One study showed that patients with RT from a living donor of fewer than five years had a better QoL. After more than five years, this effect disappeared (18). However, some studies, as our study, also show that donor type has no effect (19).

Diabetes mellitus adversely affects the QoL in patients under RRT (20,21). In comparing peritoneal dialysis patients with SF-36, the QoL of the group without diabetes was found to be better (22). Another study used the Swedish health-related quality of life scale (SwedHRQOL). People with diabetes have lower scores except for social isolation (23). We also found that the QoL improved in HD patients without diabetes. However, diabetes did not cause any harmful results in RT patients.

Previous studies have shown cardiovascular disease (CVD) adversely affects the QoL (24-27). Our study showed that CVD adversely affected the test results in both HD and RT patients, but this effect was more significant in the HD group. Studies have shown that those with CVD and those with CVD risk factors have worse results (25,28). This data may explain why the HD group's QoL is more affected, which has more CVD risk factors.

Previous studies have shown that the QoL in RT patients is better than in other RRT modalities. In addition to the literature, our study showed that the factors affecting the results of HD and RT patients differ. While gender, education, and employment status are more effective on RT patients, laboratory characteristics are more effective on the QoL of HD patients. However, phosphorus and parathormone levels within normal ranges in RT patients are also associated with improved results.

Our study has some limitations. The most important limitation is that it was performed in a single center with a small number of patients. Another limitation is that the HD patient group has a higher mean age and has more co-morbid diseases. On the other hand, the cross-sectional study may be insufficient to show real-life data. However, determining the factors affecting the QoL of patients receiving RRT with two different QoL scales emerges as the strength of our study.

CONCLUSION

As a result, factors affecting QoL in patients receiving different RRT are different. Avoiding electrolyte imbalance and controlling comorbidities are more critical for HD patients. Rehabilitative efforts for returning to working life after transplantation will increase the QoL in RT patients.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Ondokuz Mayıs University Clinical Researches Ethics Committee (Date: 26.06.2020, Decision No: 2020/417).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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